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THE UNIVERSITY OF NEBRASKA

THE SCHOOL OF MECHANIC ARTS

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THE SCHOOL OF MECHANIC ARTS

THE FACULTY

GEORGE E. MACLEAN, LL. D., Chancellor

CHARLES RUSS RICHARDS, M. M. E., Director; Associate Professor of Practical Mechanics
JAMES W. ADAMS, B. L., Professor of English
DE WITT B. BRACE, Ph. D., Professor of Physics
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HUDSON H. NICHOLSON, A. M., Professor of Chemistry
ROBERT B. OWENS, E. E., Professor of Electrical and Steam Engineering
WILLIAM G. L. TAYLOR, LL. B., Associate Professor of Political Economy
GEORGE R. CHATBURN, B. C. E., Instructor in Mathematics
W. B. HAMPSON, M. E., Instructor in Mechanical Drawing
THOMAS C. BLAISDELL, A. M., Instructor in English

THE SCHOOL OF MECHANIC ARTS

A TWO-YEARS' COURSE

GENERAL ANNOUNCEMENT

The School of Mechanic Arts meets a demand for instruction in practical mechanical work. The shops and laboratories of the University of Nebraska are made available by this school to young men from the common or district schools. There are many young men having neither the time nor the money to complete a collegiate course at the University, who will here find an opportunity of securing a practical education, fitting them for some useful place in life.

Primarily, the School of Mechanic Arts is intended for those young men who expect to enter some one of the mechanical trades, and who desire a scientific basis for this later work, although it is hoped that in many cases the stimulus given by the school will be such that a collegiate course in one of the engineering groups will be pursued. Nowhere is there greater difficulty in learning a trade than in the West, where few manufacturing industries are as yet developed. Even if this were not true, the school would offer the surest means of attaining future success, for it will give a knowledge of those things which are intimately connected with mechanical work, but which cannot be learned in the shop.

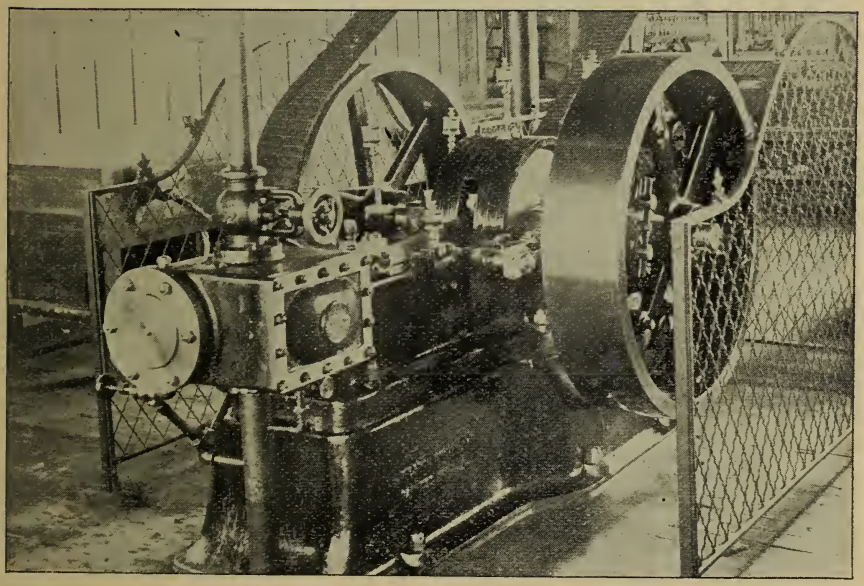
The school is in no sense a trade school, although the principles of some of the more important mechanical trades are taught. The student obtains a better conception of the relative importance of the different mechanical operations, and he is enabled to determine what particular branch of mechanical work he can most successfully pursue.

THE SCHOOL YEAR

The School year coincides with the University year, which embraces thirty-eight weeks, beginning September 16th, 1897, and closing the first week in June, 1898. It is especially desirable that students report promptly at the beginning of the school year, as it will be found difficult to do the advanced work until the back work has been made up.

REQUIREMENTS FOR ADMISSION

The school is open to young men of sixteen years of age, or over, who are not otherwise registered in the University, and who, in the opinion of those in charge of the school, have had the requisite training for properly carrying on the work. The applicant should understand arithmetic and elementary English grammar.



ENGINE FOR DRIVING THE SHOPS

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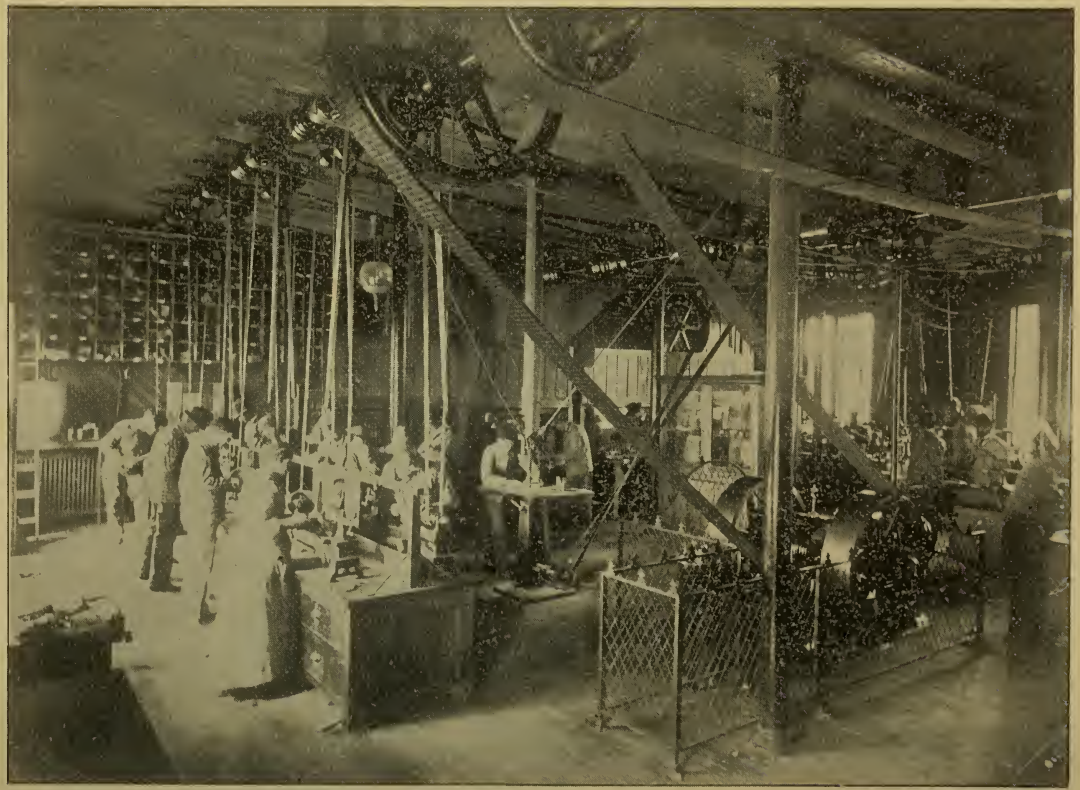


WOOD SHOP

SCHEDULE OF COURSES OF INSTRUCTION

FIRST YEAR

First Semester

1. Mathematics ..... 5 hours
2. English ..... 5 "
3. Lectures on Mechanical Practice ..... 2 "
4. Mechanical Drawing * ..... 2 "
5. Shop Work * ..... 3 "
   a. Bench Work in Wood
   b. Wood Turning

Second Semester

6. Mathematics ..... 5 hours
7. English ..... 5 "
8. Lectures on Mechanical Practice ..... 2 "
9. Mechanical Drawing ..... 2 "
10. Shop Work ..... 3 "
    a. Pattern-making
    b. Foundry Work

SECOND YEAR

First Semester

1. Mathematics ..... 5 hours
2. Theme Writing (in connection with lectures on Mechanical Practice)
3. Physics ..... 5 "
4. Lectures on Mechanical Practice ..... 2 "
5. Mechanical Drawing ..... 2 "
6. Shop Work ..... 4 "
   a. Forging in Iron and Steel
   b. Filing, Chipping, and Scraping

Second Semester

7. Political Economy ..... 3 hours
8. Theme Writing ..... 1 hour
9. Physics ..... 5 hours
10. Lectures on Steam and Electrical Machinery ..... 2 "
11. Mechanical Drawing ..... 2 "
12. Shop Work ..... 5 "
    a. Machine Work in Metals

* Three hours work in the shop or in the drawing room are equivalent to one hour credit in the schedule.

FORGE SHOP

DESCRIPTION OF COURSES OF INSTRUCTION

MATHEMATICS

Many of the practical problems which must be solved in the shop would be exceedingly difficult without a knowledge of mathematics, hence the mathematics given in this course is planned especially for the mechanic with reference to its application to mechanical work. The course includes a brief review of arithmetic; tables as labor savers; curve plotting by tables; exponential and logarithmic tables, and the slide rule; computation by logarithms; mensuration, with a sketch of its geometric foundation; use of formulae in computation; graphical methods in computation; trigonometric functions and their use; equations of the first, second, and third degree; geometric meanings and graphic solu tions; solution by tables; differentiation and integration, with their geometric and mechanical significance; use of tables of integrals, geometric integration, mechanical integrators.

ENGLISH

The ability to speak and write correct English readily should be looked upon as part of the training of every educated man. For the mechanic, it has a practical value as well, since it will enable him to occupy positions for which, without such ability, he would be unfit. The purpose of the instruction in English, as in other subjects taught in the School, is to give the student the greatest amount of practical training.

During the first year the instruction will include reading from classic authors, mainly prose, three hours each week, and English composition with the essentials of grammar and rhetoric, two hours each week. During the first semester of the second year, the student will be required to prepare each week a short descriptive paper on some mechanical subject, in connection with the lectures on mechanical practice. During the second semester of the second year, one theme each week will be required, the subject to be assigned by the instructor in English.

DRAWING ROOM

PHYSICS

The laws of motion, of heat, of electricity, and of light have a very direct bearing upon mechanical design and construction. A knowledge of the various physical phenomena is of the greatest value to the mechanic, being of direct assistance in the solution of many of the practical problems that will be presented to him. During the second year, five hours each week, including recitations and lectures with demonstrations, will be devoted to a course in general elementary physics.

CHEMISTRY

If the student expects to engage in some particular line of mechanical work, where a knowledge of chemistry will be useful, he may substitute chemistry for physics in the second year of the course. This substitution will be allowed only when sufficient reasons for such a change are presented. In general, the course in physics will be the most valuable to students in the school.

POLITICAL ECONOMY

In Political Economy will be presented to the student, in their simplest form, the most salient economic facts, such as will in the future tend to give direction and steadiness to his views and utterances as an American citizen. Those points which possess the greatest interest to the mechanic are discussed in lectures on physical and industrial conditions in the United States; the industrial revolution; the factory system; trade unions; labor and capital; money, credit, and finance; the new transportation; changes in the center of population; the winning of the West.

MECHANICAL PRACTICE

During the first year and a half of the course, two lectures a week are given on Mechanical Practice. They run parallel with the work in the shop, and are intended in part to give a better knowledge of the work done therein, and at the same time to discuss those things which the intelligent mechanic must know, but which do not necessarily form a part of his practical shop work. These lectures include a discussion of the standards of length; the form and action of carpenters' and turners' tools; the physical properties of timber; simple framed structures, floors, roofs, etc.; plans, specifications, and estimates; the metallurgy of iron and steel; the

forms and construction of patterns and core-boxes; molding and foundry practice; wood-working machinery; forging tools and machinery files; machine work in metals; and general metal-working machinery.

STEAM AND ELECTRICAL MACHINERY

A number of the more important engineering problems of peculiar interest to the mechanic who may be called upon to build, repair, or run engines, dynamos, boilers, or other apparatus for the generation or transmission of power, will be discussed in the lectures on steam and electrical engineering machinery, including the elementary theory of the steam engine, forms of engines, valve mechanism, indicator practice and engine economy; forms of boilers, boiler settings, care and management of boilers; fuels; accessory steam machinery; the gas engine; elementary theory of the dynamo; electric lighting; electric railways; electrical distribution and wiring; water power; power transmission by gears, belts, ropes, electricity, etc.

MECHANICAL DRAWING

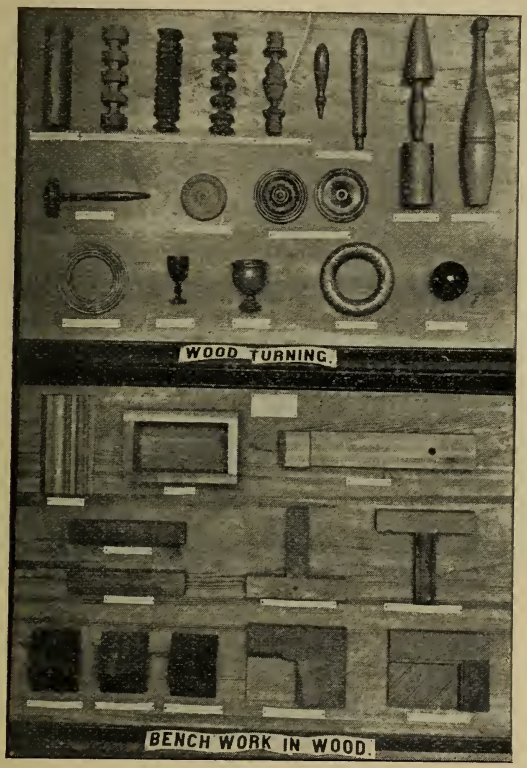
All mechanical construction is done from mechanical drawings, which to the mechanic should represent clearly the ideas of the designer. It is therefore necessary that the skilled mechanic be capable of interpreting drawings so that he may easily reproduce in wood or iron the things therein represented. Six hours each week throughout the course are devoted to mechanical drawings, and the student is then not only rendered capable of interpreting drawings, but he will have acquired the skill and ability to make them himself. The instruction includes the care and use of the drawing instruments, drawing from copy, machine sketching, detail drawing, tracing and blue printing, line shading, tinting, drawing from dictation, gears, parts of machines, etc.

SHOP WORK

The work in the shops is eminently practical, the instruction in each branch being given by a systematic course of exercises, showing the use of the different tools and the methods of mechanical construction. After the completion of any given set of exercises, the principles there learned will be applied in the construction of some complete piece of work. Since the work is solely for construction, and there is as little repetition as possible, rapidity of execution is not expected or desired. The principles of tool use and mechanical construction are taught, but great dexerity and rapidity of execution, which result from long practice, can only be obtained by outside work. The work done is as follows:

Bench Work in Wood.—A systematic course of exercises showing the use of the different carpenters' tools, and the methods of constructing various forms of splices, dovetails, joints, panels, etc. Nine hours work each week for one-half of the first semester of the first year.

Wood Turning—A systematic course of exercises showing the methods of turning plain cylinders, cutting square shoulders, turning plain and compound curves, chucking, etc. Nine hours work each week for one-half of the first semester of the first year.

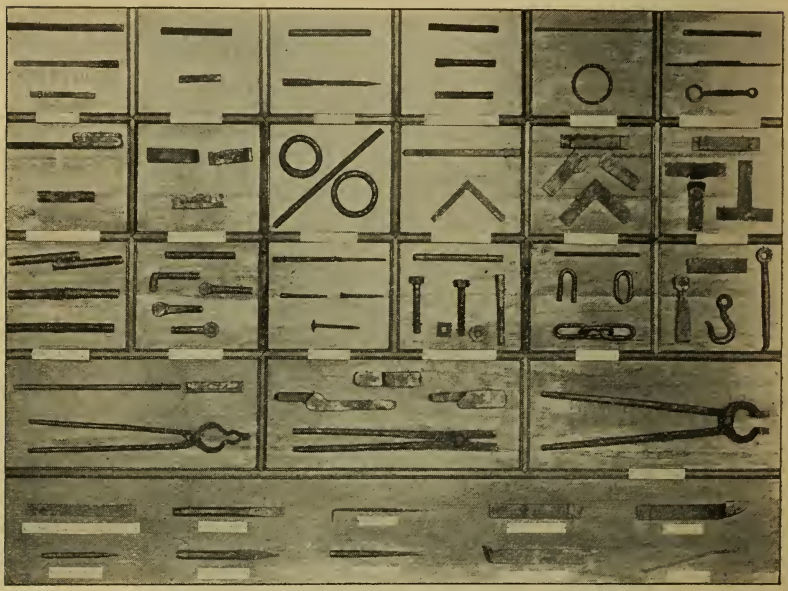


ELEMENTARY WORK IN WOOD

Pattern Making—The construction of various forms of patterns core-boxes, etc., for parts of machines. Nine hours each week dur ing the second semester of the first year.

Foundry Work—Bench and floor moulding, core-making, and casting in iron and brass. Taken in connection with the course in pattern making.

Forging in Iron and Steel—A systematic course of exercises in drawing, upsetting, bending, welding, and tempering. Applications of the above in the construction of more elaborate finished pieces of work. Nine hours each week during the first semester of the second year.



FORGE WORK

Filing, Chipping, and Scraping—The use of the cold chisel, the file, and the scraper. Exercises in chipping straight and grooved surfaces; surface and round filing; polishing, and the construction of surface plates. Three hours each week during the first semester of the second year.

Machine Work in Metals—Plain and taper turning, boring, thread cutting, drilling, planing, milling, and polishing; the construction of taps, dies, drills, reamers, and complete machines; practice in lining up shafting, etc. Fifteen hours each week during the second semester of the second year.

OTHER PRACTICAL INSTRUCTION

During the second year of the course, each student will be given practice in the care and management of the power boilers, the steam engines, and the various dynamo-electric machines, together with indicator practice, valve setting, and engine and boiler tests.

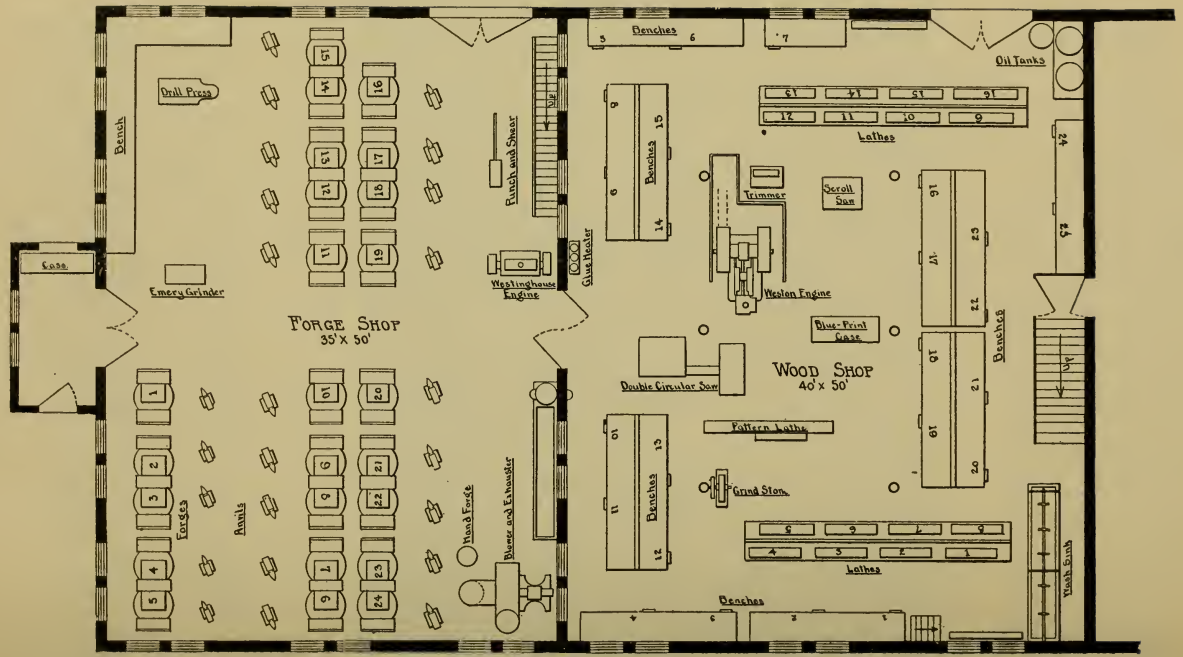
FACILITIES FOR INSTRUCTION

The Wood Shop contains twenty-five carpenters' benches, each equipped with a quick-action vise, and a complete set of carpenters' tools; sixteen ten-inch swing speed lathes, each equipped with two sets of turning tools; one large pattern-makers' lathe; one double revolving cross-cut and rip saw; one scroll saw; one universal trimmer; two grindstones; and numerous special small tools.

The Forge Shop is equipped with twenty-four stationary forges with a like number of anvils and sets of small tools. The smoke is removed and the blast supplied to the forges by a seventy-inch double ended fan. A twenty-six-inch, back-geared and power-feed drill press; a wet and dry emery grinder; a hand punch and shear; a hand forge, and benches with blacksmiths' and machinists' vises, complete the equipment.

Power to drive the shops is furnished by a 25 h. p. Weston high-speed automatic engine, and a 10 h. p. Junior Westinghouse engine, steam being supplied by a 40 h. p. vertical water-tube boiler located in the boiler house.

The Engineering Laboratory contains some fifteen dynamos and motors from 25 Kilo-watts capacity down, covering the standard types of electrical machinery at present in use. Other accessory apparatus is also provided, as well as accurate measuring instruments having



THE SHOPS
UNIVERSITY OF NEBRASKA

a wide range, to enable complete tests to be made of all electrical and steam apparatus available.

The Steam equipment consists of a 100 h. p. Stirling water-tube boiler, located in the boiler house; a 100 h. p. tandem, compound, condensing engine; a 25 h. p. center-crank automatic engine, and a 5 h. p. vertical experimental engine, together with absorption and transmission dynamometers, calorimeters, indicators, and guages for valve practice and general testing.

The Drawing-room is a large, well-lighted room, located in the second story of the new Library Building. It contains thirty-two drawing tables, and a large number of drawing boards. All paper and drafting instruments are supplied by the student.

Technical Library.—There are on file in the department libraries a number of the leading engineering journals, together with a number of reference books, bound volumes of engineering papers, and proceedings of engineering societies. The student will also have free access to all the books and papers in the general library.

EXPENSES

Tuition is free. The matriculation fee is $5.00, payable to the Treasurer of the University at the beginning of the first year only. A deposit of $5.00 is required at the beginning of each year, to cover breakage and loss of tools, and waste of material. At the end of the year the balance of this deposit is returned to the student.

Upon entering the school, the student must provide himself with a set of drafting instruments, costing about $10.00, and books, apparel for work in the shops, and in-

cidentals, costing about $3.00. Books and other incidentals for the entire year will cost about $5.00.

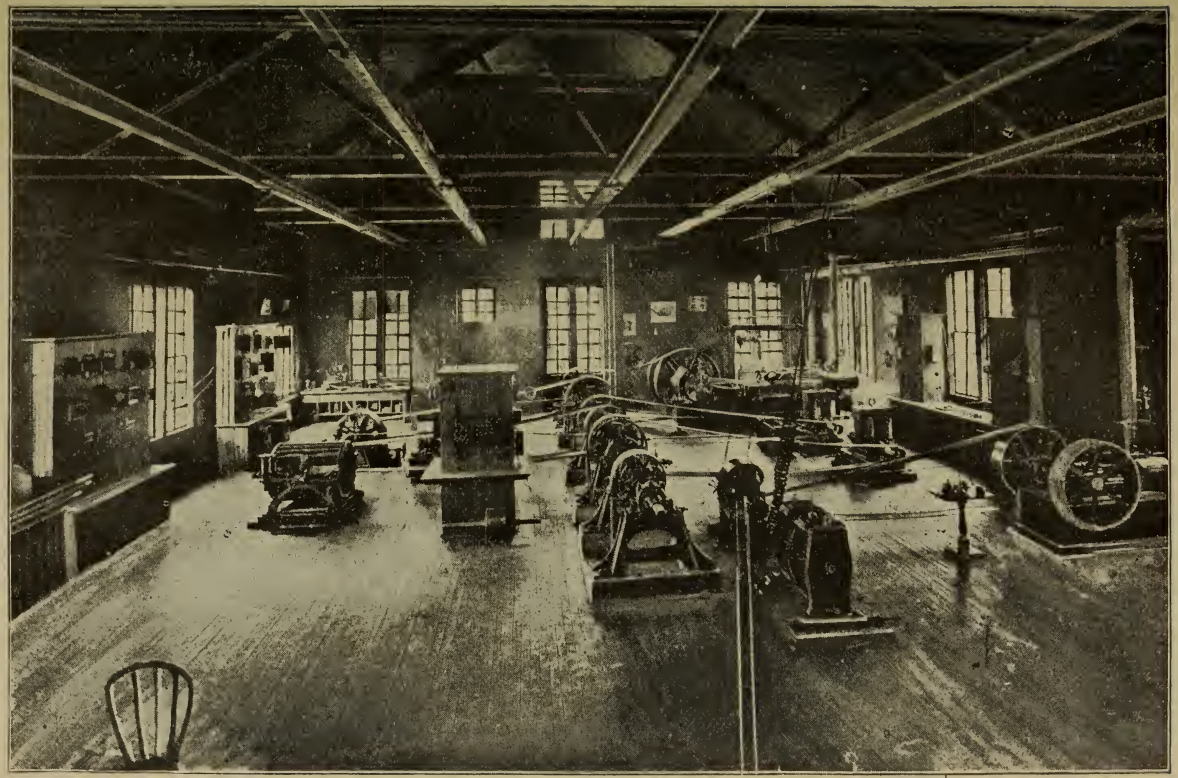
In a private family table board may be obtained for $2.25 or $2.50 per week. Some of the students' clubs give board as low as $2.00 per week. Room rent varies from $2.00 to $3.00 per month, and upward

The first year in the school will probably cost about as follows, exclusive of clothing, washing, and other incidentals:

Matriculation fee	$ 5 00
Drafting instruments	10 00
Books, etc	5 00
Waste of material and loss of tools (estimated)	2 00
Table board, 38 weeks at $2	76 00
Room rent, 9 months at $2.50	22 50
Total	$120 50

The expenses of the second year will be reduced $15.00 by the first two items. In some cases it is possible for students to secure employment during their spare time, and thus slightly reduce the above expenses.

For further information address, George E. MacLean Chancellor, The University of Nebraska, Lincoln.



ENGINEERING LABORATORY

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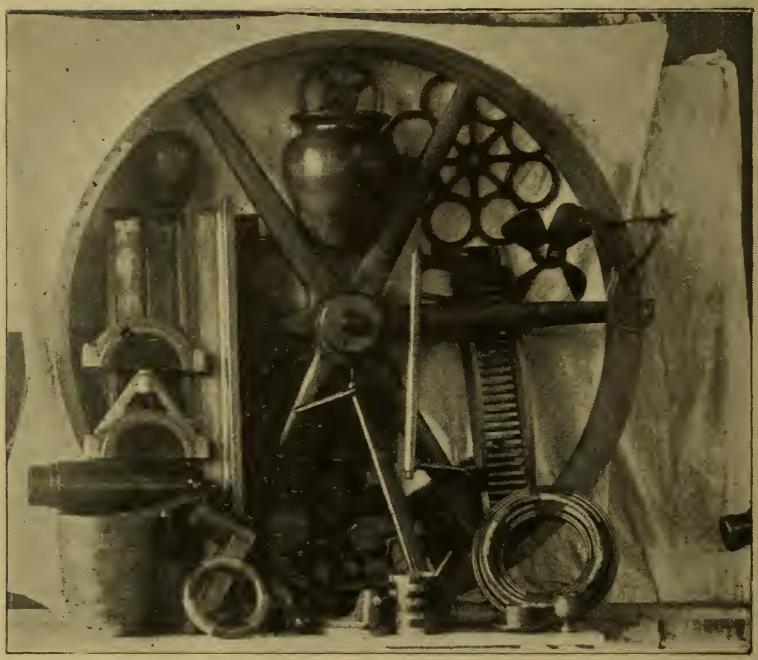

A GROUP OF PATTERNS